DOCUMENT RESUME

ED 086 739 TM 003 399

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TITLE	The Factor Structure of Consumer Beliefs and Attitudes About Medical Care: Implications for the Academic Medical Community.
PUB DATE	[73]
NOTE	20p.; Paper presented to the Annual Conference on Research in Medical Education, AAMC (12th, Washington, D.C., November, 1973)
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EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Community Attitudes; *Consumer Economics; Evaluation; Medical Education; *Medical Evaluation; *Medical Services; Medical Students; Patients (Persons); Rating Scales; *Test Construction; Test Validity
IDENTIFIERS	*Consumer Attitudes

ABSTRACT

This paper summarizes findings of a program of evaluation research. In this research the authors assumed that reliable and valid measurement of consumers' attitudes and beliefs about various aspects of medical care is possible and that more valid evaluation systems could be achieved if consumer perceptions are carefully considered during instrument development. The development and validation of seven experimental scales containing 134 variables (items) was described. The scales were administered to a representative sample of 903 heads of households in southernmost Illinois. These data were factor analyzed. Careful review of orthogonal and oblique rotations resulted in development of 20 perceptual constructs in sex areas (availability-accessibility, convenience, continuite, financial, humanness, quality). Reliabilities were computed and were high enough to warrant further study of nearly all of the constructs. Definitions of these constructs were offered. Multiple regression analyses predicting to behavioral criteria were used to obtain preliminary estimates of the validity of the constructs. The authors concluded that preliminary findings offer justification for the continued study and usage of the measurements in the evaluation of medical care facilities as well as in the evaluation of medical students and physicians at all levels of training. (Author)

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THE FACTOR STRUCTURE OF CONSUMER BELIEFS AND ATTITUDES ABOUT MEDICAL CARE: IMPLICATIONS FOR THE ACADEMIC MEDICAL COMMUNITY[1]

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This paper summarizes a program of evaluation research undertaken at the new School of Medicine, Southern Illinois University.[3] First, the research is based on the assumption that reliable and valid measurement of consumers' attitudes and beliefs about various aspects of medical care is possible. Second, the authors are attempting to determine whether or not such measurement will result in a useful contribution to instructional and evaluation systems for medical students and residents as well as increase our understanding of medical services in general. The emphasis of this paper is on the implications of the research to date with regard to the content of instructional and evaluation systems in the academic medical com-

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[1] A presentation based on this paper was given at the 12th Annual Conference on Research in Medical Education, Association of American Medical Colleges, Washington, D.C., November, 1973.

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[3] The analyses upon which this paper is based were performed in part under Contract No. HSM 110-72-299 with the Health Services and Mental Health Administration, Department of Health, Education and Welfare. Data gathering was supported through a grant to the Southernmost Illinois Health Care Planning Council from the Office of Health Affairs, OEO and was also supported by Southern Illinois University, Carbondale.

TM 003 399

munity, particularly those which address variables representing the patient point of view.

The trend toward "consumerism" in the planning and evaluation of medical care has not, generally speaking, held up under close scrutiny. Studies reporting comparisons among patient attitudinal, belief, and behavioral variables suggest that the strength of these relationships does not meet the expectations which our theories would suggest. The absence of expected empirical relationships, however, should not necessarily be taken as negation of the importance of measuring various kinds of patient perceptions. On the contrary, it may be that the strategies used to measure these perceptions have generally not been well conceived and that the concepts in question have not been adequately measured. With the exception of a few studies, researchers have not systematically applied multivariate methods and scaling techniques to the measurement problems of medical care evaluation research. Thus, it seems that considerable effort will be necessary in order to develop reliable and valid rating systems which can truly reflect the attitudinal and belief systems of patients and, hopefully, their related behavior.

In response to this dilemma, the Methods Branch of the Social and Economic Analysis Division, National Center for Health Services Research and Development (HEW) began sponsoring a program of research underway at the new School of Medicine, Southern Illinois University. The initial goals of the research were twofold. First, the investigators intended to

identify and define constructs* of importance within the perceptions of consumers in a number of conceptual areas. Second, it was hoped that the exploratory phase and resulting operational definitions would lead to the development and validation of scales to measure these constructs. This second step would yield evidence as to whether or not patient perceptions are really important, i.e., worth measuring and also any implications for the training and evaluation of physicians at all levels as well as other members of the medical team.

Several significant questions faced the researchers immediately. If these constructs exist, what is contained within them? That is, what aspects of medical care are involved? Second, what domains are involved? That is, should the focus be on what people think is important or should the emphasis be on beliefs? Should attitude scales, in the traditional sense, be developed? What statistical techniques and survey methodologies should be employed? What is the best way to study validity, and so on?

DESIGN OF THE STUDY

The overall methodology consisted of several distinct stages. First, a very large pool of questionnaire items (variables) was developed in order to estimate what researchers and evaluators had been measuring

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*The term construct is being used to refer to a homogenous group of variables which are organized in a particular way within the attitudinal and belief systems of patients. For example, a homogenous group of variables related to a patient's perceptions of the information-giving behavior of his doctor may be a construct.

to date. Second, new items were generated in order to increase the comprehensiveness of the initial item pool. Third, a number of scales were developed and administered to a large representative sample of heads of households in southernmost Illinois. Fourth, techniques of factor analysis were employed to study the content validity of hypothesized constructs and scales. Fifth, statistical methods were employed in order to estimate the reliability and validity of the new measurements.

A detailed description of the development of the survey schedule, sampling methodology, and interviewer training has been published elsewhere (Chu, Ware, and Wright, 1973). These details will only be summarized for purposes of this paper.

Instruments. Seven scales containing a total of 134 items were included in certain sections of a larger individually administered household interview schedule which was pretested and revised four times before usage.* These scales were designed to measure the following general areas (number of questionnaire items contained in each is given in parentheses):

I. Evaluation of Medical Care in the Area (24)

II. Beliefs About Physician Behavior (33)

III. Beliefs About the Comprehensiveness of the Physical Examination (9)

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*The authors gratevully acknowledge the contributions of Drs. Godwin Chu, Erwin Atwood, William Stewart, William Roddick and Robert Conn during the development of scales and the survey schedule.

IV. Beliefs About Availability of County Health Services (19)

V. Beliefs About Availability of Family Medical Care (19)

VI. Reasons for Postponing Visits to the Doctor (9)

VII. General Attitudes Toward Doctors and Medical Care (21)

Hypothesized Constructs. The general areas of importance initially hypothesized by the researchers are reflected in the titles of the seven scales. The authors speculated that constructs hypothesized within a given scale would load significantly only within that scale in a factor analytic solution. Specific hypotheses about the nature and number of constructs within patient evaluation of beliefs about, and attitudes toward medical care were made. The specific hypothesized constructs within evaluative, belief and attitudinal domains regarding medical care were: availability, accessibility, convenience, continuity, cost, humanness, perceived quality, and problems of poor patients. These a priori constructs were based on a careful review of the literature, careful review of the item pool, and the thoughts of the authors, their consultants, and medical school faculty.

The Study Sample. The area sampled would be classified as rural by any standard. A large proportion of the residents were also poor. A prior study of 16 indicators of social, economic, and health resources had clearly demonstrated that the seven target counties were among the most needy in the state (Ware, Rainey, D'Elia and Jarett, 1973). For example, the infant mortality rate for three of the counties was approximately twice that for the State. Data on disabilities, mental health admissions, and

other indicators followed a similar pattern. Despite the apparent need, medical resources were observed to be poorly distributed, underutilized (in the case of hospital beds) or nearly nonexistent. With regard to the latter point, the physician-patient ratio ranged from one physician per 1300 population to one physician per 7500 population across the seven counties.

In order to achieve a representative sample of respondents from the seven-county area, a combination of geographic cluster sampling and stratified random sampling was used (Chu, Ware, and Wright, 1973). A total of 1,202 households were drawn in order to realize approximately 900 completed interviews. The final sample of 903 respondents was composed of 37% males and 63% females. Of this sample, 83% were White and 16% were non-White (nearly all Black). Respondent ages ranged from 18 to 92 and the median age was 52. Seventy-five percent of the respondents were married, 16% were widowed, 5% were divorced, and 4% never married. Eighty-five percent had lived in the area more than five years. Twenty-six percent lived in cities in southern Illinois, 30% lived in small towns and 42% were rural. Using the Duncan Socio-Economic Index, jobs held by heads of households ranged from coal miner to surgeon. The median family income reported was $5,150 yearly. The median educational level was nine years of schooling for males and slightly higher for females. In general, sample characteristics were observed to be close to the 1970 Census for the area.

Data Analysis. Factor analytic techniques played the major role in the study of patient constructs. Briefly stated, factor analysis is a multivariate statistical procedure which helps to describe and explain observed correlations among variables. This exploratory process is particularly important in the study of patient perceptions about medical care because the constructs involved have not been adequately defined and measured.

The adoption of a particular factor analytic strategy suitable for this research followed careful comparison of six kinds of methods (Ware, Miller, and Snyder, 1973). The authors were also concerned that their solutions were not method specific and, therefore, studied the "robustness" of factors across factor analytic methods. This latter point follows the suggestion of Harris and Harris (1971). The primary method of factor analysis used in the investigation was developed by Andrew L. Comrey, a project consultant, who is a Professor of Psychology at UCLA. His methodology is very flexible and provides for investigator participation at various steps in the solution, a feature which is highly desirable in research of this kind. The methodology also has distinct advantages. Comrey's process of initial factor extraction without prior estimates of communalities is called the Minimum Residual Method (Comrey, 1962; Comrey and Ahumada, 1964). The use of the Minimum Residual solution and rotation according to the Tandem Criteria Method (Comrey, 1967) is an excellent strategy for solving the "number of factors" problem without use of other criteria (Ware, Miller, and Snyder, 1973).

This is a critical issue in the study of patient perceptions where numerous exploratory analyses are necessary and the nature and number of factors is not precisely known.

A separate solution was derived for each of the seven scales. First, a matrix of product moment correlations was computed. Factors were extracted using the Minimum Residual method and major factors were rotated according to the Tandem Criteria in order to achieve an orthogonal solution. On the basis of these rotations, certain factors (constructs) were retained for further study. Scores for retained constructs were computed using the simple algebraic sum of responses for items with high loadings on the factor. Estimates of reliability were computed and those constructs which warranted further study were used in studies of the validity of the measurements.

RESULTS AND DISCUSSION

Since a major goal of the analyses was the identification of important factors (constructs) for use in reliability and validity studies using the existing data file, a conservative criterion was employed in selecting those factors to be retained. A total of 28 factors were selected for further analysis using the criterion that retained factors must be interpretable and defined by variables having orthogonal loadings of .39 or greater.* Loadings of variables on retained factors ranged from .39 to .89. The content of

*A .40 minimum loading criterion was originally intended. However, it was violated in a few instances in order to achieve the desired number of variables in computing a factor score.

many of the derived factors is beyond the focus of this paper and, therefore, only twelve will be discussed in detail. Tables 1 and 2 give the derived factor structure of two of the seven scales. The simple structure orthogonal solutions using the Tandem Criteria Method were improved slightly through analytic oblique rotation. Orthogonal and oblique factor loadings are given in Tables 1 and 2. The first scale, Evaluation of Medical Care in the Area, contained four factors meeting the authors criterion. These factors pertain to the continuity of medical care, the cost of care, the availability of quality medical care and the availability of related medical services. The second scale, Beliefs About Physician Behavior, contained eight major factors, including: thoroughness, health counseling, surgical prudence, humanness, information giving, use of medication, female care, and use of the health care system.

At this point two separate analysis plans were initiated. One consisted of careful interpretation of all variables associated with significant factor loadings in order to improve operational definitions of constructs. This step was designed to insure that changes in construct definitions and related scale items would truly reflect consumer perceptions. All loadings of .10 or greater were considered significant in these matrices according to the criterion suggested by Cureton (1971) which relates sample size number of variables, and number of factors, and also were considered significant when magnitude of communalities were considered after the suggestion by Pennell (1968). This process resulted in operational definitions of six major constructs defined by a total of 20 minor constructs.

Table 1

Comparison of Orthogonal and Oblique Factor Loadings, 24 Variables In Scale I, A Scale To Measure Patient Evaluation of Medical Care In the Area

VARIABLE #[b]	FACTORS AND VARIABLE NAMES[c]	ORTHOGONAL[d] ROTATION	OBLIQUE[e] ROTATION
	CONTINUITY	FACTOR I	
16-302	Good doctor for whole family	.68	.68
24-310	Able to see same doctor	.56	.49
15-301	Regular medical exam	.51	.42
2-288	Doctor interested in you when you are well	.48	.42
	COST	FACTOR II	
1-287	Doctors care at reasonable cost	.61	.59
12-298	Hospital care at reasonable cost	.52	.51
4-290	Medical care for people who can't afford it	.49	.50
7-293	Good care for elderly	.46	.45
	AVAILABILITY-ANCILLARY SERVICES	FACTOR III	
17-303	Prescriptions filled day and night	.60	.69
23-309	Medical advice from druggist	.58	.68
14-300	Ambulance or rescue squad	.46	.51
13-299	Transportation to doctors office	.42	.44
	AVAILABILITY-QUALITY MEDICAL CARE	FACTOR IV	
21-307	Good medical care for children	.52	.49
8-294	Good hospital nearby	.51	.51
6-292	Medical care in emergencies	.49	.46
22-308	Specialists (O.B. & Surgery)	.49	.50

[b]Refers to order of variable in scale and interview schedule, respectively.

[c]Variable names are working abbreviations of the actual content of the scale item it represents.

[d]Based on orthogonal rotation (Tandem Criteria) of Comrey minimal residual factor analytic solution.

[e]Based on analytic oblique rotation of the orthogonal solution.

Table 2

Comparison of Orthogonal and Oblique Factor Loadings, 33 Variables In Scale II, A Scale to Measure Patient Perceptions of Quality of Medical Care Based on Statements About Doctor Behavior[a]

VARIABLE #[b]	FACTORS AND VARIABLE NAMES[c]	ORTHOGONAL[d] ROTATION	OBLIQUE[e] ROTATION
	QUALITY OF CARE--THOROUGHNESS	FACTOR I	
3-319	Examines carefully to catch minor problems	.68	.72
18-334	Thorough physical exam	.59	.63
20-336	Careful exam before diagnosis	.44	.44
2-318	Lets you tell him all you want	.41	.42
	QUALITY OF CARE--HEALTH RISK COUNSELING	FACTOR II	
29-345	Asks about and discourages drinking	.77	.78
28-344	Asks about and discourages smoking	.73	.73
31-347	Asks about family problems & treats or refers	.43	.43
30-346	Asks about foods and gives advice	.39	.38
	QUALITY OF CARE--SURGICAL PRUDENCE	FACTOR III	
23-339	Surgery only if necessary	.74	.77
24-340	Explains why surgery necessary	.74	.76
	QUALITY OF CARE--FEMALE HEALTH CARE	FACTOR IV	
33-349	Gives pap test annually	.84	.84
32-348	Examines breasts annually	.77	.77
	QUALITY OF CARE--HUMAN DIMENSION	FACTOR V	
16-332	Treats you with respect	.57	.56
1-317	Keeps a record of medical problems	.54	.52
14-330	Explains when and how to take medicine	.51	.48
13-329	Posts medical diplomas	.35	.34
11-327	Orders unnecessary lab tests	-.34	-.37
	QUALITY OF CARE--USE OF MEDICATION	FACTOR VI	
10-326	Often gives shots	.66	.68
9-325	Frequently prescribes antibiotics	.48	.50

Comparison of Orthogonal and Oblique Factor Loadings, 33 Variables In Scale II, A Scale to Measure Patient Perceptions of Quality of Medical Care Based on Statements About Doctor Behavior

Table 2 (Continued)

VARIABLE #[b]	FACTORS AND VARIABLE NAMES[c]	ORTHOGONAL[d] ROTATION	OBLIQUE[e] ROTATION
	QUALITY OF CARE--INFORMATION GIVING		FACTOR VII
6-322	Explains side effects of prescription	.57	.57
5-321	Names and explains expected effects of drugs	.52	.53
15-331	Explains nature of illness	.44	.41
17-333	Tells how to avoid illness when predisposition exists	.44	.42
	QUALITY OF CARE--APPROPRIATE USE OF HEALTH SYSTEM		FACTOR VIII
19-335	Refers to specialist when in doubt	.51	.50
22-338	Asks about allergies before prescribing medicine	.39	.37
21-337	Shows concern about use of unnecessary medicine	.39	.35
27-343	Knows about and uses available health services	.39	.38
20-336	Careful exam before diagnosis	.38	.29

[b]Refers to order of variable in scale and interview schedule, respectively.

[c]Variable names are working abbreviations of the actual content of the scale item it represents.

[d]Based on orthogonal rotation (Tandem Criteria) of Comrey minimal residual factor analytic solution.

[e]Based on analytic oblique rotaiton of the orthogonal solution.

These new definitions and their implications will be discussed later in the paper.

The second analysis plan consisted of preliminary studies of the reliability and validity of factor scores computed for constructs in the study sample. These comparisons were designed to provide preliminary evidence of the usefulness of the measurements prior to investing additional resources in their development. The findings of these preliminary analyses will be discussed first. Table 3 gives a summary of internal consistency reliability estimates for the seven scales and constructs contained within them. The Alpha formula due to Cronbach (1951) was used in computing these estimates. Alpha coefficients usually agree with estimates based on the alternate form method of determining reliability although the latter would tend to be slightly lower. Recall that construct (factor) scores were computed from the simple algebraic sum of item scores for those items selected to define the construct. This procedure is certainly more practical than standardizations and transformations which consider magnitude of factor loadings. It is also important to note that only the four most important variables (i.e., highest factor loadings) were selected to define the construct. This decision relates to a practical constraint. Four items can be completed by nearly all respondents in less than one minute.

As a preliminary test of the validity of these constructs, factor scores (using simple algebraic sum of item responses) were used as multiple predictors in three regression analyses using behavioral criteria. The technique of iterative multiple correlation (Greenberger and Ward, 1956)

Table 3. Summary of Estimates of Reliability, Seven Scales and 28 Constructs

	Scales	Reliability Coefficients: Number of Constructs	Total Scale	Range for Constructs	Median for Constructs
I.	Evaluation of Medical Care in the Area	4	.87	.69 - .78	.73
II.	Beliefs About Physician Behavior	8	.89	.51 - .89	.73
III.	Beliefs About the Physical Examination	3	.97	.93 - .97	.96
IV.	Beliefs About County Health Services	3	.75	.57 - .84	.77
V.	Beliefs About Family Medical Care	4	.83	.70 - .81	.77
VI.	Reasons for Postponing Doctor Visits	3	.66	.46 - .72	.60
VII.	Attitudes Toward Doctors and Medical Care	3	.32	.00 - .33	.30

was used in the REGRAN program offered by Veldman (1967).

The three behavioral criteria were the number of physician visits reported by the respondent during one year (Y_1), whether or not the respondent reported changing physicians due to dissatisfaction with care received (Y_2), and whether or not the respondent reported having a medical checkup during the previous year (Y_3). Since the respondent's health status and ability to pay (income) would logically account for performance of the criterion behaviors, health status and income were treated as covariates in a partial regression model in order to estimate the amount of variance they accounted for. That is, we are interested in the amount of variance in behavior accounted for by the constructs over and above that accounted for my health status and income. Thus, the regression models of interest were as follows:*

Model I (Full Model)

$$Y = a_1 X_1 + a_2 X_2 + \ldots + a_{30} X_{30}$$

Where:
Y = Behavior in question
a = Beta weights for predictors
X = Covariates and predictor variables

Model II (Partial Model, Covariates Only)

$$Y = a_1 X_1 + a_2 X_2$$

Where:
Y = Behavior in question
a = Beta wieghts for covariates
X_1 = Health status
X_2 = Income

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*The authors gratefully acknowledge the suggestions of William Miller and John Pohlmann in developing these models.

Model III (Partial Model, Predictors Only)

$$Y = a_3X_3 + a_4X_4 + \ldots . a_{30}X_{30}$$

Where:

Y = Behavior in question
a = Beta weights for predictors
X = Predictor variables

The observed multiple correlations are given in Table 4 for three models as applied to each of three behavioral criteria for the study sample (N=903).*

Table 4. Results of Regression Analyses

Models	Behavioral Criteria: Number of Dr. Visits	Changed Doctors	Physical Check-up
Full Model (I) (Covariates and Predictors)	.520*	.289*	.330*
Partial Model (II) (Covariates Only)	.417*	.043	.034
Partial Model (III) (Predictors Only)	.378*	.282*	.329*

*F is significant according to the author's criterion ($p < .01$)

As expected, the full model (predictors and covariates) accounted for a significant amount of variance in all three behavioral criteria. The amount of variance accounted for by the partial models consisting of covariates (health status and income) were significant for only one of the three

*It should be noted that multiple correlation estimates tend to be systematically biased upward. However, because of the large sample size, these estimates would not "shrink" more than .03 according to the shrinkage formula suggested by Nunnally (1967, p. 164).

behavioral criteria (number of doctor visits). It is not surprising that visits to the doctor are explained, in part, by health status and income. It is surprising that a significant increase in the multiple correlation is observed when the predictors are added to the model and that the multiple correlation for the predictors alone is so high ($r = .378$). With regard to the other two behavioral criteria, the importance of the predictors is clearly evident. The multiple correlation between predictors only and doctor change ($r = .282$) and predictors only and check-ups ($r = .330$) are significant. Multiple correlations for covariates were not significant for either of the latter behavioral criteria.

These results were accepted as preliminary evidence of the validity of patient perceptions. The fact that eight of the constructs involved pertain to patient beliefs about what physicians do during treatment, suggests that patients may be more sophisticated than one might expect. Finally, the results of these preliminary analyses were taken as justification for continued refinement and expansion of measurements of patient perceptions. These refinements will be discussed below to the extent that they apply directly to medical school curricula and evaluation.

The discussion to follow will include a brief summary of the relationship between hypothesized constructs and those validated through factor analysis. Recall that eight constructs had been hypothesized by the authors. Seven of the constructs (availability, accessibility, convenience, continuity, cost, humanness, and perceived quality) were confirmed. The observation that "problems of poor patients" did not appear in the solution suggests that

one should not ask someone to give his attitudes about the attitudes of others.

With regard to cost, it is important that consumers differentiate between absolute cost and payment mechanisms, i.e., problems of "cash flow." This observation suggests that the two should be measured separately. Other constructs were also supported by the solutions, including: availability, accessibility, and convenience of care. These constructs have important implications for the planning and evaluation of health care delivery systems and the authors suggest that they be integrated into medical school curricula in keeping with the definitions validated by consumers.

Of particular importance to the focus of this paper are constructs which directly relate to patient perceptions of the behavior of physicians and other members of the medical team. These constructs are grouped in the general categories of continuity of care, humanness of care, and quality of care.

The construct of continuity of care supports the trend in residency education toward training specialists in family practice. Satisfaction with continuity of care means that patients perceive their care as an unbroken succession of events. It includes being able to see the same doctor, having one doctor for the whole family, getting regular medical check-ups, and good follow-up care.

The humanness of medical care, perhaps, refers to behaviors along the lines of what has been popularized as the "Doctor Welby" image.

Included are variables which measure patient satisfaction with the way patients are made to feel during the treatment relationship, i.e., respect shown, considerations of feelings, and efforts to explain things so as to avoid worry.

A very interesting finding of this research is the high degree of specificity observed within the construct perceived quality of care. Whereas the authors had hypothesized it as a single construct, seven homogenous perceived-quality-of-care constructs were validated by the factor analysis, as follows: Thoroughness, Health Risk Counseling, Prudence in the Use of Surgery, Female Health Care, Use of Medication, Information Giving, and Use of the Health System. Variables which relate to the quality of various aspects of medical care as perceived by the respondent are included in this construct. The question addressed is whether or not the absence (or presence) of certain characteristics of care contribute to how good the care is perceived to be. The authors realize that these variables may, in fact, be unrelated to the actual technical quality of care received by the respondent; however, we are confident that they constitute (measure) the variables on which the respondents actually base assessment of the quality of the care received. Included within perceived quality of care are variables related to completeness (comprehensiveness) of care received, thoroughness in information gathering, thoroughness in the giving of information, counseling as to alternatives and consequences, and discretion and caution (prudence) during patient management. It is

interesting to note that patients even differentiate between information giving aimed at patient comfort (i.e., humanness) and information giving to insure that the patient knows what he is expected to do (i.e., quality of care).

The authors are currently engaged in further refinement and validation of these and other aspects of patient perceptions about the care they receive. Satisfaction, beliefs, and the importance placed on these constructs are being separately measured. Rating scales which emphasize the patient point based on careful study of patient perceptions are being developed and their use will be recommended to the medical school faculty. It is expected that these operational definitions and the scale items associated with them can improve the reliability and validity of evaluation systems throughout the continuum from graduate medical education to continuing education. There are problems of differences among patients with regard to the importance placed on the constructs. However, we are attempting to measure these domains separately. If we are successful, it may be that the consumer of medical care can become an important member of the evaluation team in the academic medical community.